Irrigation and Tragedy in Cache Valley, Utah: A Historical Perspective on a Contemporary Disaster

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Water is of critical importance to human life, especially in places such as the American West. Managing it, fighting over it, and praying for it are central concerns in Utah, and likewise in Logan, a small town in the north of the state. This essay begins with the tragic failure of a local canal and uses that event to look backwards to local and regional water history. Its primary arguments are that local irrigation did experience difficulty and that it took a tragedy to resolve a persistent local irrigation-related problem. In addition, this essay also shows the contested nature of water and water-project funding in a small western town.

Three authors can help contextualize this exploration. George Clyde, a former governor of Utah and a water development engineer himself, provides a traditional technical view. In his brief “History of Irrigation in Utah,” Clyde talks about Latter-Day Saint “pride in the fact that our desert has literally been made to bloom as the rose.”

Clyde refers to the 1902 Federal Reclamation Act as “the salvation of the West” and describes water unused by humans as “waste.” However, there are deviations. Clyde has a surprising humbleness, describing early LDS irrigation ideas as “primitive in the extreme” and more modern works as “made possible only by the tremendous advance in

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2 Ibid., 32-34.
equipment and tools.” He also discusses difficulties faced by private irrigation companies during the second phase of Utah’s irrigation (the 1880s to 1900s).

In its arguments, this essay most closely matches Thomas Alexander’s “Irrigating the Mormon Heartland: The Operation of the Irrigation Companies in Wasatch Oasis Communities, 1847-1880.” Alexander argues that although the Mormons were ultimately successful in their efforts to “transform a rich wilderness into an equally rich land of farms, towns, and businesses,” they faced significant difficulties and setbacks along the way, and even abandoned multiple projects. This essay also focuses on irrigation difficulty rather than success, although ultimately the irrigation would continue. Furthermore, by his title alone one can see that Alexander intends to contest the traditional story of LDS irrigation efforts making the desert bloom like a rose. He argues convincingly that the landscape was already richly endowed and was transformed rather than created.

Last, Barre Toelken’s “Traditional Water Narratives in Utah” reminds us how important water is to local culture. Toelken notes that the LDS Church initially controlled water in Utah and that local bishops are still involved. He mentions an entire town was temporarily excommunicated over a water dispute and that a dispute in 1988 resulted in a church being blown up, a thirteen-day stand-off with law enforcement, and the death of an officer. Regarding canals specifically, Toelken focuses on a traditional LDS story

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3 Ibid., 27, 34.

where a couple is at temple and, upon the wife feeling something ominous, rushes home to find one of their young male children has been saved from drowning by a ghostly stranger. Drowning in irrigation canals is common in Utah, and Toelken cites the *Deseret News* report stating that seventeen children under the age of five drowned in Utah irrigation canals between 1985 and 1989. The 2009 tragedy in Logan was far from the first and yet, Toelken explains, the cultural importance of the canals is strong enough that people fight to keep them open. The arguments and observations of these three authors echo through this essay.

A brief note on timing is in order. This paper was originally written in the spring of 2013 and it reflects a situation that was in flux at that time, rather than resolved. In the interests of preventing this paper from verging too far towards contemporary matters, I have chosen not to expand and update it to reflect continued developments.

On July 11, 2009, part of the Logan Northern Canal broke, causing a mudslide that killed Evelia Jacqueline Leavey and two of her children, Victor Alanis Jr. and Abbey Alania Alanis. According to Christopher Smart of the *Salt Lake Tribune*, Victor Alanis (the children’s father) and Antonio Ortiz (Leavey’s father) both filed suit against several parties in 2010. Parties sued included “Logan City, the Utah Department of Transportation, the Logan and Northern Canal Company, Utah State University, and Eric Ashcroft, the owner of the house the family was renting.” The two lawsuits were settled in February 2011 (with the exception of the suits against Ashcroft, which were still

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pending as of August 2011). The public entities paid a combined total of $300,000. The Logan and Northern refused to disclose what it paid, however, the total settlement was 1.25 million, and simple subtraction would leave the Logan and Northern with a payment of $950,000.6

The canal company currently stands to receive 25.8 million to rebuild their water delivery system, replacing the canal with a pipe. 75% of the costs are to come from federal disaster relief, with the remaining 25% plus all over-runs to be borne by local and state funding.7 The proposed rebuilding should mitigate the landslides, however, as discussed below, they are likely to continue to occur. Human safety will ultimately be guaranteed by Logan City’s decision to condemn and purchase housing along the base of the bluff.

This essay is focused around the engineering and construction of the Logan and Northern (formerly Logan and Richmond) Canal. It inquires into the causes of these slides, and local responses to them. A simple version of the story is that nineteenth-century Latter-Day Saint pioneers cut a canal across a steep bluff, which destabilized and likely moistened the bluff. Locals also began to irrigate the top of the bluff, soaking it with water and thus causing further destabilization. Several slides occurred over the following century and half, during which time the community grew exponentially and


housing began to encroach upon the base of the bluff. Studies were done, and landslides were a known issue, but major action was not taken until the fatal 2009 slide. And now the canal has been abandoned and Logan City is in the process of removing people from base of the bluff. That is the simple version. The more complicated story follows.

Water has a way of denying borders, both physical and academic. It can be, indeed demands to be, analyzed from a multitude of perspectives. For example, in his *Hazardous Metropolis*, Jared Orsi notes that “where, when, and how water flowed in San Antonio had as much to do with ethnic relations and distribution of political power as it did with engineering, water, or weather.”8 One of Richard White’s main points in his *Organic Machine* is that the Columbia River cannot be fragmented and analyzed piece by piece. It cannot be treated as less than a whole. For example, “we can’t treat the river as if it is simply nature and all dams, hatcheries, channels, pumps, cities, ranches, and pulp mills are ugly and unnecessary blotches on a still coherent natural system. These things are now a part of the river itself.”9

The Logan Bluff is no different. Multiple local municipalities have an interest in its water (or storm water) management and delivery systems, and Logan City has a critical interest in protecting its citizens from landslide hazards. A state highway runs along the base of the bluff, and a state university sits at the top. The canal originates on Forest Service land, and the state engineer was involved in plans for the new canal. Governmental, University, and private institutions have provided research and analysis on slope failure causes. As noted above, federal money finances most of the current

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project. Local people, particularly along the slide-zone, have been affected by slides, and will be affected by the city’s condemnation of and offer to purchase their homes. Immediately after the 2009 slide, the LDS Church organized thousands of locals and worked with city services to clean and control the situation. And, without question, Evelia Jacqueline Leavey, Victor Alanis Jr., and Abbey Alania Alanis should be foremost in our thoughts.

The depth and variety of primary material alone is overwhelming, and so this essay will cover only a little of the available material. However, readers must be aware of how multi-faceted and intertwined this subject is. As one would expect with a question relating to water, there is a range of relevant secondary literature. In *Rivers of Empire*, Donald Worster discusses human control of water and the “hydraulic societies” built by Western irrigation systems.\(^\text{10}\) Human control is a main theme, as illustrated by phrases such as “precise calculation,” “advanced technological mastery of water,” and “command over nature.”\(^\text{11}\) Worster devoted a section to discussing LDS irrigation, titling it “The Lord’s Beavers.”\(^\text{12}\) Here he argues that religion provided the initial organizing force, and was later replaced by economic motives. In addition, as irrigation became relatively less profitable, capitalists invested elsewhere.\(^\text{13}\) This essay does not intend to critique Worster, but it does focus on what happens when the irrigation process encounters failure. The


\(^{11}\) Ibid., 4, 11, and 15, respectively.

\(^{12}\) Ibid., 74–83.

\(^{13}\) Ibid., 82.
Logan Bluff was clearly not controlled, and it is important to examine what happens when the system does not work.

Donald Pisani’s *To Reclaim a Divided West: Water, Law, and Public Policy, 1848-1902* obviously is less concerned with slope failure and engineering details. However, Pisani contests Worster’s thesis, arguing that Worster “reduce[s] complicated history to little more than a morality play,” continuing to say that Worster’s historical actors are one-dimensional and that local conditions and historical context are ignored.¹⁴ Perhaps the Logan Bluff landslides are a piece of this overlooked local context. As he wraps up his conclusion, Pisani offers an extensive reminder of just how chaotic and disorganized the federal government could be, a clear opposite to a model hydraulic society. Pisani discusses the fragmentation of federal offices and expertise, observing that, “under the circumstances, it is not surprising that no coherent water or land policy emerged from Washington.”¹⁵ An extensive quote from Gifford Pinchot’s autobiography, noting that “we were like loose horses in a field,” and “every bureau chief was for himself and his own work, and the devil take all the others,” seals this impression of chaos and lack of coordination between federal offices.¹⁶ Although Pisani’s argument refers to the second half of the nineteenth century, perhaps it is enough to suggest that the default assumption should not be one of federal (or even governmental) coordination and

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¹⁵ Ibid., 333–34.

control. Chaos may be every bit as likely as a precisely organized hydraulic administration.

White’s *Organic Machine* includes passages similar to Pisani’s, especially with White’s discussion of Lewis Mumford’s *The Pentagon of Power*, which White describes as “dire, portentous, totalizing, and omniscient.”17 White sees “contest, conflict, division, and compromise where Mumford saw a relentless and triumphant megamachine.”18 Water appears to be a field where answers are especially messy and local, even within a discipline as given to messy complexity and locality as history. White’s history is a history of the relationships between actors and elements of the Columbia River, which is something like taking the history of every actor and element, drawing lines between any that can relate, and then writing a history of the lines. White took a seemingly hopeless task and turned it into a slim, elegant volume.

Jared Orsi’s *Hazardous Metropolis* is closest to this paper’s topic of landslides. As noted above, Orsi sees a confluence of a multitude of factors, and finds that they frequently interact in unforeseen ways.19 He uses the word “ecological” to describe this complex set of interrelationships.20 Two of his points are particularly valuable to this essay. First, after citing numerous examples, Orsi writes that “if such disorder is as


18 Ibid. It must be noted that White does not wish to dismiss Mumford, but to question what he sees as the extreme of Mumford’s position and then use that discussion to further his own analysis.


20 Ibid., 173.
ubiquitous as it seems, then the world is perhaps put together quite differently from how we think it is." 21 Second, he writes:

Thus, the Los Angeles urban ecosystem is not merely a better-designed version of a messy nature. Instead, complexity increases the number of ways that water can flow destructively, and at the same time, tight coupling requires that it flow exactly one way. As a result, the system is prone to failures, especially floods. 22 The Logan Bluff fits the second, but the first does not quite apply. Landslides were relatively well-known and well-understood. It is possible that even as early as 1909 locals understood the basic mechanics tested and described by the Utah Geographic Survey over half a century later. What was lacking was not knowledge, but the will and power to make change. In Logan’s case, this will and power was political. However, the increasingly urban environment continually reduced the margin for error and also elevated the potential harms of landslides.

After this glance at the secondary literature, the next task is to investigate the canal’s origins. The History of a Valley, edited by Joel E. Ricks and Everett L. Cooley, provides key information on nineteenth-century irrigation in Cache Valley. Their Table VI lists the valley’s canals, their length, the river they draw from, the year construction was started, acres irrigated at the time of publication (1956), and the local regions served. Construction was started on the Logan and Richmond Canal in 1864. The canal is now known as the Logan and Northern. By 1956, the Logan and Richmond was 16 miles long and irrigated 3,700 acres, making it about the median size of local canals, but substantially smaller than the big ones, such as Cub River and Worm Creek, serving 10,000 acres in Preston, Fairview, and Franklin with construction

21 Ibid., 172.
22 Ibid., 177.
commencing in 1881; and West Cache, serving 17,200 acres in Cornish, Trenton, Newton, Lewiston, and Amalga with construction commencing in 1899.\(^23\)

Five other canals were started in 1864. The Wellsville East Field Canal, drawing from the Little Bear River, was begun in 1860, and is the only local canal whose construction definitely predates the Logan and Richmond. The Nibley Canal, drawing from the Blacksmith Fork River, is listed as being started in the “1860s,” and so the dating is not clear. This makes the Logan and Richmond one of the valley’s early “pioneer” canals, rather than one of the later ones built under different circumstances in the 1880-1910 period.\(^24\)

Leonard Arrington contributed four chapters to *History of a Valley*, including one where he has a paragraph explaining how these early canals were built:

> The chief deterrent to advanced irrigation development was the lack of tools and equipment. The pioneers used wooden plows drawn by ox teams to dig canals, or dug them by hand with pick and shovel. The initial digging was followed by use of a “go devil,” constructed of two large logs fastened together in the shape of a V, as a snow plow. Loaded with men and pulled with several yoke of oxen, this instrument pushed the loose dirt to the sides to make the bank for the canal. Pioneer canal builders had no levels, according to Engineer T. H. Humpherys, so they used pails of water in the simplest projects, or a Jacob’s Staff or homemade plumb in the longer canals. The latter was a frame 16 by 20 feet, with a stake or peg on each side. One stake was longer than the other, by a measured amount, so as to define the amount of fall needed for water to run downhill. A plumb bob was suspended over the center of the frame to achieve the exact measured fall. With

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this device, the canal could be laid off twenty feet at a time, and engineers could be certain that the canal would carry the water.\textsuperscript{25} Construction would have proceeded somewhat differently on the Logan and Richmond, at least along the hillside that is of particular concern to this paper. In that area, pioneers almost certainly had to excavate the hillside first, digging out a triangular chunk horizontally across the slope. In addition to digging the canal, the slope above would have to be shored up and supported. Seth Olsen wrote a masters thesis in Civil and Environmental Engineering at Utah State University, and he chose this “landslide zone” as his topic. Regarding the slope, he notes that “cutting the canal into the slope further steepened the slope from its natural geometry and increased instability.”\textsuperscript{26} Olsen also provides a photograph and excerpt from the January 1899 minutes of the Logan and Richmond Canal Company discussing a slope failure and showing efforts to protect the canal.\textsuperscript{27} A walk along the canal today shows sections where much larger retaining walls hold back a slope that is very steep.

In addition to explaining early construction methods, Arrington also gives us an idea of the growth of irrigation in nineteenth-century Cache Valley. He explains that

\begin{itemize}
\item \textsuperscript{26} Seth P. Olsen, “History of the Logan Bluff Landslide Zone” (Masters Thesis, Utah State University, 2006), 8.
\end{itemize}
“virtually all of the easily irrigated part of the valley was placed under irrigation by 1870,” and also gives us an idea of the growth of irrigation in the valley, with some 50,000 irrigated acres [in] production by 1880, and more than 90,000 acres by 1900. This represented 1,225 farms in 1880, and 2,506 farms in 1900. By 1900 there were 118 separate cooperative canal systems in the valley. Most of these early cooperative projects were never incorporated and still remain as mutual companies managed by and belonging to the farmers they serve.

The Logan and Richmond company minute books offer further information, though unfortunately the earliest minute book I have access to begins in 1878, and so does not cover the building of the canal. First, the company bylaws explain members must pay an annual tax to draw water from the canal. This is supported by the accounting sheets, which follow each year’s minutes. Interestingly, the accounting sheets have two columns, one for payments in labor, and another for payments in cash. Reading through the minutes, it becomes clear that Cache Valley was a cash-poor community in the early 1880s, as evidenced by the variance in the rate of payment, depending on whether an individual paid with labor (likely more abundant, given its lower value) or cash (likely scarce, given its high value). The October 11, 1880 minutes note that the tax is 15 cents per acre in labor, 10 cents per acre in cash. This is repeated in 1881, with that year’s October 10 minutes stating the rate at 25 cents in labor, and 12 ½ cents in cash. Rates were raised to cover several costs, as this was a big year for both maintenance and

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29 Ibid., 150.
30 “Logan and Richmond Canal Company Minute Book” n.d., MSS 238, no. 55, Utah State University Special Collections.
31 Ibid., 67.
32 Ibid., 90.
improvements. The Logan and Richmond undertook extensive cleaning of the canal, worked on the headgate up Logan Canyon, and committed to assisting in building a dam under the direction of a road-way supervisor near their headgate (though this dam was to be paid for by W. B. Preston in return for water rights to irrigate the Logan Canyon Field). 33

These payments in labor and trades for water rights offer a key to understanding the Logan and Richmond’s operation. The March 8, 1879 minutes record that a man was given a water right in return for labor in 1865 and 1868. A similar water right in exchange for labor was issued the following month. 34 And then we get to the big names. Both Logan City and Richmond City petitioned the Logan and Richmond Canal for water rights in 1879. Richmond requested a water right based on the labor they provided in 1865 and 1868 and also wanted to enlarge the canal by six feet to carry water to 2,000 additional acres. Calculations were made, with the committee judging that the enlargement “would require moving of 36,883 yds of earth which at 15 cts per yard would amount to $5532.45 and a floom 326 ft at a cost 456 (11) making a total of $5,988.” 35 Thomas Smith, the Logan City Watermaster, petitioned for a perpetual water right for his city’s use. 36 The canal company recognized Richmond’s labor at a value of

33 Ibid., 86–90. The canal company records discuss Preston as a private individual, and make no mention of him representing larger groups, such as wards or municipalities. In addition, Arrington’s discussion of Preston (see my fn 33) does not suggest that Preston represented anything more than a private interest, or, perhaps a canal company interest (which is an interesting mix of public and private).

34 Ibid., 27–30.

35 Ibid., 31–34. I am not sure what is meant by the (11). Given the arithmetic, it does not appear to represent pennies.

36 Ibid., 36.
$4,000 and granted their request to enlarge the canal. They also granted Logan City’s request, although with numerous conditions. They required that the canal be widened at Logan City’s expense but under their direction, that Logan City bear the winter expenses of the canal, and that the city pay a yearly cleaning tax.

Work was to start the first Monday in January and be finished by March 31, 1879. Digging ditches in the middle of a Cache Valley winter sounds foolhardy, but apparently it was common at this time. Arrington writes that the Smithfield Canal Company began digging in 1881 and that “the men worked in the winters and in the summer when time could be spared from their farms.” Work was limited more by time than by weather. The widening of the Logan and Richmond commenced in January of 1880, and both cities renegotiated, opting to do less work widening the canal (Logan hoped to avoid widening it entirely). By July compromises had been made and the minutes record that both cities had completed their work.

From these records, we see that the Logan and Richmond had ownership of a water right, which they then distributed in return for improvements to the canal and yearly maintenance. They seem to have functioned as a sort of water-bank, where a sufficient deposit, often paid in labor, granted access to a yearly flow. Also, we see that although this water-right was held by a group of private persons, it was sold or traded to

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37 Ibid., 36 (Smithfield) and 38-9 (Logan).

38 Arrington, “Transition to the Modern Era 1890-1910,” 209. Interestingly, Arrington mentions a W. B. Preston as a vice-president of the Smithfield Canal Co. This is likely the same W. B. Preston named in the above water-right trade with the Logan and Richmond.

city governments. It was a private corporation in which the public held shares or use-rights.

Looking at landslides in particular, the Logan and Richmond Canal Co. entry for January 18, 1909 records financial transactions in the wake of one of these slides. There are two transactions, a $5,000 loan from the state legislature (which the company wanted to modify) and a payment of $4,210 from Utah State University. The notice of payment from USU mentions that the slide occurred “above the canal” which is a key factor in determining whether a given slide is caused by USU’s water use or the Logan and Richmond’s water use. Although a slide occurring above the canal could be caused by cutting the canal out of an already steep slope, they are usually regarded as having more to do with USU’s use of water, saturating the hillside and making it prone to late-season collapses. What is surprising is that individuals in 1909 may have been aware of this. Why would USU be charged for damages to the canal if it was not seen as contributing to the instability of the slope? Further evidence would be ideal, but it is possible that top-slope irrigation was already a known factor.

Immediately we see that this case is financially different than most recent slide of 2009. Given the funding arrangements of the current deal, ⅞ of the burden is to be shouldered by the national public, ¼ (plus overruns) by the state and local public.

Turning back a century, we have a different picture. The Canal Co. did indeed receiving money from a public institution, but it was money for damages inflicted on the Canal

40 Ibid., 412.

41 Explanations of landslide causes will be dealt with more fully below, in the discussion of Seth Olsen and Richard Buhler’s theses.
Co.’s property. Most importantly, rather than receiving free money for repairs, the state legislature offered the Canal Co. a loan. This is a huge difference from the current circumstances. The 1909 Logan and Richmond did not have access to federal money, they had to rely on the state, and the state was stingy. Second, the combination of access to federal money and the tragic nature of the 2009 slide seem to combine to make a strong application for funding. It seems likely that access to federal funding smoothed the way for the current proposal. If 100% of the 2009 award had to come from state and local sources, I imagine it would have been more difficult to obtain. The combination of tragedy and access to federal funds could be critical to understanding our current circumstances.

Two masters students at USU discussed the history and causes of these slides. In 2006, Seth Olsen wrote a “History of the Logan Bluff Landslide Zone.” Richard Buhler published his “Factors Affecting Landslides Hazards and Hazard Analysis of Logan Bluff” in 2008. In his section on background, Buhler examines past research by several agencies, including the Utah Geologic Survey (UGS). These reports tell us several things about our Logan Bluff landslides. First, they tend to occur in the fall. This is abnormal for Cache Valley and also indicates that they are probably not caused by snowmelt. One cause is USU’s irrigation and the irrigation of other water-users to the north, on the plateau above Logan Bluff (such as the Logan Country Club). This water seeps down through the bluff (as found by UGS when they placed dye in a trench above the bluff)

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42 Olsen, “History of the Logan Bluff Landslide Zone.”

and by moistening the slope causes instability. Another cause is seepage from the canal. A third cause is that by cutting the canal out of the slope, the slope was destabilized.

Several of these slides have occurred over the years. Olsen has listed over a dozen. Buhler records several groups who have made studies and presented findings. In fact, Buhler provides a map that lists the location of the 2009 slides as an orange “likely” category for landslides. This was very clearly a well-known issue, but it took a tragedy to implement change.

So what changes will be made? How will that 25.6 million be spent? First, Logan City has condemned a stretch of buildings along base of the slope and is in the process of buying up properties from those willing to sell. Second, the water that was carried through the canal partway down the bluff will now be re-routed through a pre-existing canal that runs along the top of the bluff. That upper canal will be piped. Improvements to the canal are wide-ranging and deal with much more than just the water seepage implicated in the 2009 slide. Hard News Cafe writer Lis Stewart wrote an article based in part on an interview with State Engineer Bronson Smart. Stewart writes, “There is a long-term community benefit to saving water, Smart said. Communities that hold shares in the canal can make decisions on what to do with the water, whether to generate power or send water to irrigation.”

Many residents are upset with the changes. Losing the above-


ground water-feature is a serious loss to property values and enjoyment. In addition, the old recreational trail running along the canal is still blocked by a chasm where the 2009 slide occurred. In fact, residents have filed suit to prevent the project from being completed, and at least one of those suits is still extant as of the date of this paper.

Although the current solution is expensive and requires a large sum of federal money, the combined solutions of Logan City and what is now the Logan Northern Canal Company do seem to have put people out of harm’s way. Given the irrigation continuing along the top of the bluff, we can most likely expect further slides, though the likelihood of lethal slides has been greatly reduced. The canal company should also be able to avoid liability in future suits, unless the new piping develops a leak. For those concerned with the confluence of human and environmental problems, we have a case of man-made landslides, which were studied but left largely alone until they became fatal.

Referring back to Orsi’s *Hazardous Metropolis*, this is less a case of lack of knowledge than a case of lack of will. This both a human and environmental story, and without tragedy, the human narrative would likely not have developed the way it did in 2009. What we have is an interesting case of a reversal in the narrative of irrigation progress. Even if the broader narrative remains one of technological domination, our stories of failure are as important as our stories of success.

References


“Logan and Richmond Canal Company Minute Book,” n.d. MSS 238, no. 55. Utah State University Special Collections.


